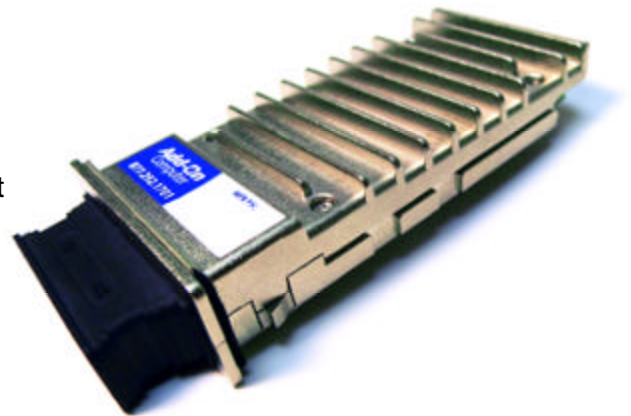


X2-10G-MMF-AO

10GBASE X2 Transceiver

Features

- Hot pluggable X2 MSA form factor
- Total power consumption: 4.0 W maximum
- RoHS-6 compliant (lead-free)
- Temperature range 0°C to 70°C
- Transmission distance of 300m
- Uncooled 1310nm directly modulated Fabry-Perot laser
- SC connector, multimode fiber
- Full duplex transmission mode
- Digital Optics Monitoring (DOM)
- Power supply: +5.0 V, +3.3 V
- Adaptable Power Supply (APS: +1.2 V)
- XAUI electrical interface
 - 4x 3.125 Gb/s Ethernet
 - 4x 3.1875 Gb/s Fibre Channel
- Management and control via MDIO 2-wire bus
- 70-pin connector
- Separated signal/chassis ground
- Mid Pak module variance for front panel mounting
- De-latch mechanism with low extraction force



Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Storage Ambient Temperature1)	TS	-40	85	°C
Operating Case Temperature1)	TC	0	70	°C
Supply Voltage +5.0 V	V5	0	6	V
Supply Voltage +3.3 V	V3	0	4	V

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Supply Voltage APS	Vaps	0	1.5	V
Static Discharge Voltage, All Pins2)	STd		500	V
Average Receive Optical Power	RxP	max	1.5	dBm

Exceeding any one of these values may permanently destroy the device.

Electrical Characteristics

Recommended Operating Conditions

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Operating Case Temperature	TC	0		70	°C
Transponder Total Power Consumption	P			4	W
Supply Voltage +5.0 V	VCC5	4.75	5	5.25	V
Supply Current +5.0 V	ICC5			10	mA
Supply Voltage +3.3 V	VCC3	3.14	3.3	3.47	V
Supply Current +3.3 V	ICC3			830	mA
Supply Voltage APS	VCC aps	1.152	1.2	1.248	V
Supply Current APS	ICC aps		830	850	mA

Electrical DC Characteristics

(VCC5= 4.75 V to 5.25 V, VCC3= 3.14 V to 3.47 V, VCCaps= 1.152 V to 1.248 V, TC= 0°C to 70°C)

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
1.2 V CMOS (1.8 V CMOS Compatible1)) I/O DC Characteristics (PRTAD; LASI; RESET; TX_ONOFF)					
External Pull-up Resistor for Open Drain	<i>Rpullup</i>	10		22	k?
Output High Voltage2)	<i>Voh</i>	1			V
Output Low Voltage2)	<i>Vol</i>			0.15	V
Input High Voltage	<i>Vih</i>	0.84		1.5	V
Input Low Voltage	<i>Vil</i>			0.36	V
Input Pull-down Current3)	<i>lpd</i>	20		120	μA
MDIO I/O DC Characteristics (MDIO; MDC)					
Output Low Voltage5)	<i>VOL</i>	−0.3		0.2	V
Output Low Current	<i>IOL</i>			20	mA
Input High Voltage	<i>VIH</i>	0.84		1.5	V
Input Low Voltage	<i>VIL</i>	−0.3		0.36	V

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Pull-up Supply Voltage	<i>VPU</i>	0.84	1.2	1.5	V
Input Capacitance	<i>CIN</i>			10	pF
Load Capacitance	<i>CLOAD</i>			470	pF
External Pull-up Resistance	<i>RLOAD</i>	200			?

1) For 1.8 V CMOS $V_{oh} = 1.65 \text{ V min.}$, $V_{ol} = 0.15 \text{ V max.}$, $V_{ih} = 1.17 \text{ V min.}$, $V_{il} = 0.63 \text{ V max.}$

2) $R_{pull-up} = 10 \text{ k}\Omega$ to 1.8 V.

3) $V_{in} = 1.8 \text{ V}$.

4) AC coupled.

5) $I_{OL} = 100 \mu\text{A}$

Electrical AC Characteristics

($V_{CC5} = 4.75 \text{ V to } 5.25 \text{ V}$, $V_{CC3} = 3.14 \text{ V to } 3.47 \text{ V}$, $V_{CCaps} = 1.152 \text{ V to } 1.248 \text{ V}$, $T_C = 0^\circ\text{C to } 70^\circ\text{C}$)

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
XAUI Input AC Characteristics (TXLANE[0..3])					
Baud Rate	RXAUIIN				Gbit/s
Fibre Channel			3.1875		
Ethernet			3.125		
Baud Rate Tolerance	RTOLXAUI	−100		100	ppm
Differential Input Impedance	ZINXAUI	80	100	120	?
Differential Return Loss(1)	S11	10			dB
Input Differential Skew(2)	<i>tSKEWIN</i>			75	ps
Jitter Amplitude Tolerance(3)	JXAUITOL			0.65	Ulp-p
XAUI Output AC Characteristics (RXLANE[0..3])					
Baud Rate Fibre Channel Ethernet	RXAUIOUT		3.1875 3.125		Gbit/s
Baud Rate Variation	RXAUIVAR	−100		100	ppm
XAUI Eye Mask (far-end)	According to IEEE 802.3ae and 10G Fibre Channel				
Output Differential Skew	<i>tSKEWOUT</i>			15	ps
Output Differential Impedance	ZOUTXAUI	80	100	120	?
Differential Output Return Loss(1)	S22	10			dB
Total Jitter(4)	TJXAUI			0.35	UI
Deterministic Jitter(4)	DJXAUI			0.37	UI
Power-On Reset AC Characteristics					
Power-On Reset and TX_ONOFF Characteristics	According to XENPAK MSA Issue 3.0, 2002-9-18				
MDIO I/O AC Characteristics (MDIO; MDC)					

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MDIO Data Hold Time	t_{HOLD}	10			ns
MDIO Data Setup Time	t_{SU}	10			ns
Delay from MDC Rising Edge to MDIO Data Change	t_{DELAY}			300	ns
MDC Clock Rate	f_{MAX}			2.5	MHz

- 1) 100 MHz to 2.5 GHz.
- 2) At crossing point.
- 3) Per IEEE Std 802.3ae.
- 4) At near-end, No pre-equalization, 1 UI = 320 ps.

Optical Characteristics

Parameter	Bandwidth Min Modal (MHz*Km)	Conditions	Symbol	Min	Typ	Max	Units
Transmitter							
Nominal Wavelength			ITRP	1260	1310	1355	nm
Spectral Width					0.4	0.45	nm
Nominal Signaling Speed			f_{OPT}	9.95		10.71	GBd
Launch Power		in OMA	P_{optOMA}	-4.3			dBm
Average Launch Power			P_{optavg}	-4.5		+0.5	dBm
Extinction Ratio			ER	3.5	5.5		dB
Relative Intensity Noise			RIN			-128	dB/Hz
Receiver							
Center Wavelength			λ_X	1260	1310	1355	nm
Receiver Sensitivity		in OMA@ 10.3125Gb/s)	PINS			-6.5	dBm
Stressed Receiver Sensitivity		in OMA	PIN			-7.5	dBm
Saturation Input Power			PSAT			1	dBm

General Specifications

Optical Interface Standard Specifications

Standard	Fiber Type	Minimum Modal Bandwidth at 1310 nm (MHz*km)	Operating Range 1) (meters)
IEEE	62.5 μ m MMF	160	220

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	50 µm MMF	400	100
Fibre Channel	62.5 µm MMF	200	220
	50 µm MMF	500	220
	50 µm MMF	2000	220

Notes:

1) Operating range as defined by IEEE and Fibre Channel standards. Longer reach possible depending upon link implementation.

Environmental Performance

Operating case temperature:

0°C to +70°C

Operating humidity:

0% -95% RH non-condensing

Fibers and Connectors

The transponder has SC receptacles for both Tx and Rx. The transponder is designed for multimode SC cables, 0° polished endface (PC).

70-pin Connector

The module interface connector is a 70-pin, printed circuit board edge connection with a 0.5 mm pitch. The appropriate mating connector for the customer PCB is a 70-pin SMT, dual row, right angled, edge connector, 0.5 mm pitch (Tyco Electronics part number 1367337-1, Molex part number 74441-0003 or equivalent).

Rail and Mechanical Mounting Requirements

The X2 rail system required to mount the X2 module is fully defined by the MSA. (Tyco Electronics part number 1367608-1: designed for belly to belly applications; and 1367610-1, designed for single sided board mount to fit into the standard host PCB footprint; or equivalent). For further details please refer to vendor-supplied information.

Regulatory Compliance

Feature	Standard	Comments
ESD: Electrostatic Discharge to the	EIA/JESD22-A114-B (MIL-STD 883D	Class 1a (> 500 V)
Electrical Pins (HBM)	Method 3015.7)	

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Immunity: Against Electrostatic Discharge (ESD) to the Module Receptacle	EN 61000-4-2 IEC 61000-4-2	Discharges ranging from ± 2 kV to ± 25 kV to the front end / faceplate / receptacle cause no damage to module (under recommended conditions).
Immunity: Against Radio Frequency Electromagnetic Field	EN 61000-4-3 IEC 61000-4-3	With a field strength of 10 V/m, noise frequency ranges from 10 MHz to 2 GHz. No effect on module performance between the specification limits.
		Noise frequency range: 30 MHz to 40 GHz
Emission:	FCC 47 CFR Part 15,	Radiated emission does not exceed specified
Electromagnetic Interference	Class B EN 55022	limits when measured with module inside a
(EMI)	Class B CISPR 22	shielding enclosure with a MSA conforming cutout

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DOM Parameters

Parameter	Values			Unit
	Min.	typ.	Max	
Laser Bias Current Monitor Accuracy ⁽²⁾	-10		+10	%
Transmit Power Monitor Accuracy ⁽³⁾	-3		3	dB
Receive Power Monitor Accuracy ⁽³⁾	-3		3	dB

1) 0 to 70°C case temperature.

2) 0 to 12.5 mA.

3) -8.2 dBm to +0.5 dBm.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Module Retention Force (latch strength)	FRET		200		N
Module Insertion Force	FIN		40		N
Module Extraction Force (with kick-out)	FEXT-K		16		N
Module Extraction Force (without kick-out)	FEXT		25		N

Eye Safety

This laser based multimode transceiver is a Class 1 product. It complies with IEC 60825-1 Ed.2: 2007 and FDA performance standards for laser products (21 CFR 1040.10 and 1040.11) except for deviations pursuant to Laser Notice 50, dated June 24, 2007.

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Contact Information

Add-On Computer, Inc. is a leading supplier of Memory Upgrade, Network Transceivers and Network connectivity products to Channel Partners, Resellers and OEMs, with more than seventeen years of direct industry experience. Add-On Computer (ACP) has been the exclusive supplier to Ingram Micro's "Memory Upgrades" program for the past nine years.

Add-On Computer maximizes profitable opportunities for our partners. Our ability to source product worldwide, ensures that our pricing will always be competitive. Offering turnkey solutions, Add-On Computer has forged a reputation as a solutions provider, delivering high quality, cost effective product in a timely and reliable manner.

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